

Standard Operating Procedure for the Determination of Turbidity

1.0 Scope and Applicability

Turbidity in water is caused by the presence of suspended matter, such as clay, silt, finely divided organic and inorganic matter, plankton, and other microscopic organisms. Turbidity is an expression of the optical property that causes light to be scattered and absorbed rather than transmitted in straight lines through the sample. The higher the intensity scattered light, the higher the turbidity. Turbidity is measured in drinking water, ground water, surface water and other samples as requested.

2.0 Summary of Method

The sample is mixed and quickly poured in the cuvette. The result is read in NTU units. Samples from 0 through 4000 should be able to be analyzed without dilution.

3.0 Definitions

3.1 NTU Nephelometric Turbidity Units

3.2 EPA Environmental Protection Agency

3.3 Linear Calibration Range (LCR) -The concentration range over which the instrument response is linear.

3.4 MSDS - Material Safety Data Sheets contain safety information about the chemicals used in each method.

4.0 Interferences

4.1 Air bubbles, and dirt on the cuvette.

4.2 The presence of true color will cause turbidities to be low.

4.3 Light absorbing materials such as activated carbon in significant concentrations can cause low readings.

5.0 Safety

This method does not address all safety issues associated with its use. The laboratory and its director are responsible for maintaining a safe work environment and current awareness of the file of OSHA regulations regarding the safe handling of the chemicals. An MSDS should be available for the standards used in this method.

6.0 Equipment and Supplies

Note: Brand names, suppliers and part numbers are cited for illustrative purposes only. No endorsement by EPA is implied. Equivalent performance may be achieved using equipment and materials other than those specified here, but demonstration of equivalent performance that meets the requirements of this method is the responsibility of the laboratory.

6.1 Hach Model 2100 N Turbidimeter

6.2 Cuvettes or sample cells

7.0 Reagents and Standards

The Advanced Polymer Systems Standards for the Hach 2100 N are used to calibrate the instrument, our gel secondary standards are to be calibrated against the primary standards and then used to check the instrument weekly. Secondary standards should be checked against the primary standards at least every 4 months.

8.0 Sample Collection

Samples may be collected in any container and should be refrigerated at 4 degrees C and analyzed within 48 hours.

9.0 Quality Control

9.1 Weekly check the secondary gel standards and record in log book. If standards are off by more than 10% the instrument should be recalibrated with the primary standards.

9.2 Each run consists of 10 or fewer samples, and should include a duplicate which should be within 10% of the original sample.

10.0 Calibration and Standardization

10.1 Calibration of the 2100N

- 10.1.1 Select the following on the 2100n : NTU units, auto range, signal averaging, and ratio. They will have a green indicator light if on.
- 10.1.2 Select a clean scratch-free cuvette.
- 10.1.3 Press the CAL button and the small red lights in the mode display should 00.
- 10.1.4 Fill a clean cuvette with 0.0 NTU primary water. Place into sample holder, close cover, and press enter. The display counts down from 60 to 0 and makes a measurement which is stored and used to calculate a correction factor for the measurement of all NTU standards. **NOTE: Wipe the cuvette clean after pouring in the sample.**
- 10.1.5 The instrument automatically increments to the next standard and displays the expected NTU value, ie. 20.00 NTU. The number 01 is shown on the mode display.
- 10.1.6 Remove the 0.0 NTU standard. Rinse and fill with the 20 NTU standard, place into the sample holder, close cover, and press enter. The display counts from 60 to 0 and takes a measurement
- 10.1.7 The instrument automatically increments to the next standard, the display shows 200 NTU and the standard number 02 is displayed.
- 10.1.8 Remove the 20 NTU standard. Rinse and fill the cuvette with 200 NTU standard, place into the sample holder, close cover, and press enter.
- 10.1.9 When the number 03 is displayed, repeat the procedure for the 1000 NTU, and the 4000 NTU standard in the same respective manner.
- 10.1.10 After the 4000 NTU standard countdown is complete, the display will show 00 again. The calibration is complete. Press Cal to store the new calibration and return the instrument to measurement mode.
- 10.1.11 Insert the gel secondary standards into the sample cell, close cover, read the value in NTU. Change the value on each standard. Record these values in the notebook with the date calibrated.

Record the values of these standard each week in the notebook.

11.0 Procedure

11.1 Be sure the following are selected on the 2100 N: NTU units, auto range, signal averaging, and ratio. There is a green indicator light to signal that they are on.

11.2 Mix the sample being careful not to shake the sample too vigorously so as to introduce air bubbles. **Wipe the cuvette clean.** And insert the sample into the sample holder. Close the cover. Read the result in NTU. (A blinking display indicates that the sample is too high and must be diluted and remeasured.)

12.0 Data Analysis and Calculations

The results are read directly in NTU units unless the sample is diluted. The sample results are entered in the Laboratory LMS system. Results from 0.0 to 1.0 are recorded to the nearest .05 results from 1 to 10 are recorded to the nearest .1. Results from 10 and above are recorded to the nearest whole number.

13.0 Pollution Prevention

This method does not use any hazardous chemicals. Samples themselves might be hazardous and you should take appropriate precautions such as wearing gloves and washing hands.

14. Waste Management

There is not waste associated with this method . For further information on waste management consult the Waste Management Manual for Laboratory Personnel and Less is Better: Laboratory Chemical Management for Waste Reduction, both available from the American Chemical Society's Department of Government Relations and Science Policy, 1155 16th Street N.W. , Washington D.C. , 20036

15.0 References

EPA Method 180.1

Hach 2100 N Operator's Manual

16.0 Tables, Diagrams, Flowcharts, Validation Data, and Additional Information

Documentation and Records

All records are kept in the turbidity parameter book in the bookcase in room 306.